REMARKS

This Amendment is submitted in reply to the Final Office Action dated January 27, 2010. Applicant respectfully requests reconsideration and further examination of the patent application pursuant to 37 C.F.R. § 1.113.

Summary of the Examiner's rejections

Claims 33, 50, 52, 55, 57, 60 and 63 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Naden (US 7,184,703) in view of Zhu (US 7,085,314).

Claims 34, 36-37, 53-54 and 61-62 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Naden (US 7,184,703) in view of Zhu (US 7,085,314) and further in view of Sim (US 7,236,591).

Claims 38-43 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Naden (US 7,184,703) in view of Zhu (US 7,085,314) and further in view of Kostusiak (US 5,115,224).

Claims 44-49, 58 and 59 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Naden (US 7,184,703) in view of Zhu (US 7,085,314) and further in view of Applicant's admitted prior art (AAPA).

Claims 56 and 64 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Naden (US 7,184,703) in view of Zhu (US 7,085,314) and further in view of Khorram (US 7,130,601).

Claim 51 stands objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Claim 65 was allowed.

Summary of claim amendments

Applicant has amended independent claims 33, 52 and 60, wherein the support for the amendment related to the "reliability value" can be found on page 13, lines 15-26 of the originally filed patent application and the amendment related to the "transmitted

digital communication" was made for purposes of clarity and does not add new subject matter.

Remarks regarding objected claim 51

Claim 51 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. Applicant submits that amended independent claim 33 (the base claim to dependent claim 51) is patentable over the cited art as discussed in detail below. Accordingly, Applicant respectfully requests the removal of this particular objection.

Remarks regarding the §103(a) rejections

Applicant respectfully submits that the amended independent claim 33 is patentable in view of Naden, Zhu or any combination thereof. The amended independent claim 33 recites the following:

> 33. A wireless relay based network, comprising:
> a first node;
> at least one relay station; and
> a second node;
> wherein said first node communicates with said second node via said at least one relay station, wherein each relay station is operative to:
> receive a digital communication from said first node;
> compute a plurality of reliability values for a plurality of symbols in the received digital communication, where each reliability value indicates how likely the corresponding symbol is a binary 0 or a binary 1; and,
> transmit a digital communication which corresponds to the received digital communication but also has the computed reliability values embedded therein to said second node (emphasis added).

The Examiner indicated that Naden failed to teach the computing of a plurality of reliability values for a plurality of symbols in the received digital communication and the transmitting of a digital communication that has the computed reliability values embedded therein to the second node (see paragraph 4 in Final Office Action). In view of Naden's deficiencies, the Examiner cited Zhu and stated "Zhu teaches a method and apparatus for reducing signal degradation in a received signal [Title], whereby a method

of modifying the values of a plurality of digital filter coefficients for use by a digital filter which is a component of a relay station, the relay station successively receiving a first signal, modifying the first signal using the digital filter to form a second signal, and transmitting the second signal with amplification [Column 2, lines 36-42]" (see paragraph 4 in Final Office Action).

In view of the Final Office Action, Applicant has amended the independent claim 1 to recite where each relay station is operative to: receive a digital communication from said first node; compute a plurality of reliability values for a plurality of symbols in the received digital communication, where each reliability value indicates how likely the corresponding symbol is a binary 0 or a binary 1; and, transmit a digital communication which corresponds to the received digital communication but also has the computed reliability values embedded therein to the second node (emphasis added). In particular, Applicant has defined the claimed term "reliability value" to be as follows "each reliability value indicates how likely the corresponding symbol (within received digital communication) is a binary 0 or a binary 1". In addition, Applicant has clarified that the transmitted digital communication corresponds to the received digital communication but also has the computed reliability values embedded therein.

As indicated above, Zhu's relay station successively receives a first signal, modifies the first signal using the digital filter to form a second signal, and transmits the second signal with amplification. The claimed relay station differs in at least two respects with Zhu's relay station. First, the claimed relay station computes "reliability values" which have been defined as follows "each reliability value indicates how likely the corresponding symbol (within the received digital communication signal) is a binary 0 or a binary 1". Thus, the claimed relay station's "reliability value" should no longer be interpreted to relate to the Zhu relay station's "amplification" of the second signal. Second, the claimed relay station transmits a digital communication which corresponds to the received digital communication but also has the computed reliability values embedded therein to the second node. Thus, the claimed relay station's transmitted digital signal should no longer be interpreted to relate to the Zhu relay station's "second signal".

The Examiner should also appreciate that the claimed relay station addresses a drawback with the prior art where the known relay stations had problems of creating a large amount of redundancy in the case where only an amplified version of the received communication is created in the relay station, or the relay station (e.g., Zhu's relay station) makes "hard decisions" that are fed forward to the receiving device (see background section in present patent application). As discussed above, the claimed relay station is operative to: receive a digital communication from said first node; compute a plurality of reliability values for a plurality of symbols in the received digital communication, where each reliability value indicates how likely the corresponding symbol is a binary 0 or a binary 1; and, transmit a digital communication which corresponds to the received digital communication but also has the computed reliability values embedded therein to the second node. This has the desirable effect where the individual symbols in the transmitted signal are "labeled" with reliability values by the relay station without the need for the relay station to take any "hard decisions". Instead, the second node is allowed to take the reliability values for individual symbols into account in its processing of the received digital communication when making the "hard decisions". Sim, Kostusiak, and Khorram do not correct the deficiencies of Naden and Zhu. In view of at least the foregoing, Applicant submits that the aforementioned substantial differences between the amended independent claim 33 and the cited prior art are indicative of the patentability of the amended independent claim 33 and the corresponding dependent claims 34-51.

Referring now to dependent claims 38-43, Applicant submits that these claims are not taught or suggested by Naden, Zhu, Kostusiak or any combination thereof. As discussed above, Naden and Zhu failed to teach the claimed relay station which is operative to: receive a digital communication from said first node; compute a plurality of reliability values for a plurality of symbols in the received digital communication, where each reliability value indicates how likely the corresponding symbol is a binary 0 or a binary 1; and transmit a digital communication which corresponds to the received digital

communication but also has the computed reliability values embedded therein to the second node. Kostusiak does not cure these defects. Kostusiak teaches the following:

> A personal security system includes at least one movable transmitter adapted to produce an emergency signal transmission when activated and a plurality of transceivers adapted to receive emergency signal transmissions from the movable transmitter. The received strength of an emergency signal received by one of the transceivers is compared with the received signal strength of an emergency signal received by other of the transceivers, and an alarm signal is produced by a transceiver in response to receipt of a transmission whose signal strength is stronger than any other transmission signal strength to which it has been compared. The alarm signal may include a code identifying both the activated movable transmitter and the transceiver producing the alarm signal.

(see abstract).

The Examiner stated "Kostusiak teaches a personal security system network whereby each receiving transceiver will transmit a relay signal, which combines (i.e. embeds) the emergency signal with additional received-signal-strength indication (RSSI) information" (see paragraph 12 on page 7 of the Final Office Action). In particular, Kostusiak teaches a receiving transceiver which sends a relay signal that combines an emergency signal and RSSI information. Kostusiak's RSSI information is a single measurement which is based on the power of the received emergency signal. In contrast, the present invention's transmitted digital communication has embedded therein a plurality of reliability values which are based on the reliability of a plurality of symbols in the received digital communication. This is an important difference since the present invention can utilize the plurality of reliability values in different ways to transmit the digital communication. For instance, the dependent claim 38 recites one way that the claimed relay station can use the plurality of reliability values to transmit the digital communication. The dependent claim 38 recites the following:

> 38. The wireless relay based network of Claim 33, wherein the computed reliability values are embedded in the transmitted digital communication such that high reliability symbols are transmitted with higher power and low reliability symbols are transmitted with lower power to said second node.

As can be seen, the claimed relay station uses the plurality of reliability values to transmit the high reliability symbols at a higher power and the low reliability symbols at a lower power. Kostusiak's receiving transceiver having the single RSSI measurement would not be able to use the single RSSI measurement to transmit different parts of the emergency signal at different powers. Moreover, Applicant has defined "reliability values" such that "each reliability value indicates how likely the corresponding symbol (within the received digital communication signal) is a binary 0 or a binary 1". Thus, Applicant has defined the claimed "reliability values" in a way that differentiates them from Kostusiak's RSSI. Similar defects are present with respect to the pending dependent claim 39. The pending dependent claim 39 recites the following:

> 39. The wireless relay based network of Claim 33, wherein the computed reliability values are embedded in the transmitted digital communication in a manner where the reliability symbols are used to modulate an amplitude of the digital communication transmitted to said second node.

As can be seen, the claimed relay uses the plurality of reliability values to modulate an amplitude of the transmitted digital communication. One skilled in the art would appreciate that it would take more than one reliability value to modulate the amplitude of the transmitted digital communication. Kostusiak's receiving transceiver having the single RSSI measurement would not be able to use the single RSSI measurement to modulate the relay signal. Moreover, Applicant has defined "reliability values" such that "each reliability value indicates how likely the corresponding symbol (within the received digital communication signal) is a binary 0 or a binary 1". Thus, Applicant has defined the claimed "reliability values" in a way that differentiates them from Kostusiak's RSSI. Similar defects are present with respect to the pending dependent claim 40. The pending dependent claim 40 recites the following:

> 40. The wireless relay based network of Claim 33, wherein the computed reliability values are embedded in the transmitted digital communication in a manner where the reliability symbols are used to modulate a phase of the digital communication transmitted to said second node.

As can be seen, the claimed relay uses the plurality of reliability values to modulate a phase of the transmitted digital communication. One skilled in the art would appreciate that it would take more than one reliability value to modulate the phase of the transmitted digital communication. Kostusiak's receiving transceiver having the single RSSI measurement would not be able to use the single RSSI measurement to modulate the relay signal. Moreover, Applicant has defined "reliability values" such that "each reliability value indicates how likely the corresponding symbol (within the received digital communication signal) is a binary 0 or a binary 1". Thus, Applicant has defined the claimed "reliability values" in a way that differentiates them from Kostusiak's RSSI. Similar defects are present with respect to the pending dependent claim 41. The pending dependent claim 41 recites the following:

> 41. The wireless relay based network of Claim 33, wherein the computed reliability values are embedded in the transmitted digital communication in a manner where the reliability symbols are used to vary a bandwidth of the digital communication transmitted to said second node.

As can be seen, the claimed relay uses the plurality of reliability values to vary a bandwidth of the transmitted digital communication. One skilled in the art would appreciate that it would take more than one reliability value to vary the bandwidth of the transmitted digital communication. Kostusiak's receiving transceiver having the single RSSI measurement would not be able to use the single RSSI measurement to vary the bandwidth of the relay signal. Moreover, Applicant has defined "reliability values" such that "each reliability value indicates how likely the corresponding symbol (within the received digital communication signal) is a binary 0 or a binary 1". Thus, Applicant has defined the claimed "reliability values" in a way that differentiates them from Kostusiak's RSSI. Similar defects are present with respect to the pending dependent claim 42. The pending dependent claim 42 recites the following:

> 42. The wireless relay based network of Claim 33, wherein the computed reliability values are embedded in the transmitted digital communication in a manner where the reliability symbols are used to vary a signal time occupation of the digital communication transmitted to said second node.

As can be seen, the claimed relay uses the plurality of reliability values to vary a signal time occupation of the transmitted digital communication. One skilled in the art would appreciate that it would take more than one reliability value to vary the signal time occupation of the transmitted digital communication. Kostusiak's receiving transceiver having the single RSSI measurement would not be able to use the single RSSI measurement to vary the signal time occupation of the relay signal. Moreover, Applicant has defined "reliability values" such that "each reliability value indicates how likely the corresponding symbol (within the received digital communication signal) is a binary 0 or a binary 1". Thus, Applicant has defined the claimed "reliability values" in a way that differentiates them from Kostusiak's RSSI. Similar defects are present with respect to the pending dependent claim 43. The pending dependent claim 43 recites the following:

> 43. The wireless relay based network of Claim 33, wherein the computed reliability values are embedded in the transmitted digital communication in a manner where the reliability symbols are used to vary a signal constellation size of the digital communication transmitted to said second node.

As can be seen, the claimed relay uses the plurality of reliability values to vary a signal constellation size of the transmitted digital communication. One skilled in the art would appreciate that it would take more than one reliability value to vary the signal constellation size of the transmitted digital communication. Kostusiak's receiving transceiver having the single RSSI measurement would not be able to use the single RSSI measurement to vary the signal constellation size of the relay signal. Moreover, Applicant has defined "reliability values" such that "each reliability value indicates how likely the corresponding symbol (within the received digital communication signal) is a binary 0 or a binary 1". Thus, Applicant has defined the claimed "reliability values" in a way that differentiates them from Kostusiak's RSSI. In view of at least the foregoing, Applicant submits that the aforementioned substantial differences between the cited art and the pending dependent claims 38-43 are indicative of the patentability of the pending dependent claims 38-43.

Referring now to the amended independent claims 52 and 60, Applicant respectfully submits that these claims are patentable in view of the cited art. The amended independent claims 52 and 60 each recite the same or similar distinguishing limitations that have been discussed above with respect to amended independent claim 33. As such, the aforementioned remarks regarding the patentability of amended independent claim 33 apply as well to the amended independent claims 52 and 60. Accordingly, Applicant respectfully request allowance of the amended independent claims 52 and 60 and their corresponding dependent claims 53-59 and 61-64.

CONCLUSION

In view of the foregoing remarks, Applicant believes all of the claims currently pending in the application to be in a condition for allowance. Therefore, Applicant respectfully requests that the Examiner withdraw all rejections and issue a Notice of Allowance for pending claims 33-65.

The Commissioner is hereby authorized to charge any fees for this paper to Deposit Account No. 50-1379.

Applicant requests a telephonic interview if the Examiner has any questions or requires any additional information that would further or expedite the prosecution of the Application.

Respectfully submitted,

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